Text-mining IMF country reports - an original dataset

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Abstract

This article introduces an original panel dataset based on the text of country reports by the International Monetary Fund. It consists of a total of 5561 Article IV consultation and program review documents, published between 2004 and 2018 on 201 countries. The text of these reports provide indications of the perceived policy weaknesses, economic risks, ongoing reforms and implemented or neglected policy advice. Thus the content of IMF reports are widely used in the economics, political science and IR literature. To our knowledge this is the first comprehensive dataset that aggregates these country reports.

The paper gives a detailed account on the data acquisition and management process. To demonstrate and validate the dataset's application for research we present three validation exercises. We find that Article IV reports can indicate incoming institutional reforms, show changes in IMF policy advice over time and identify potential gains from recently discovered natural resources in certain cases. Taken together, this paper contributes an original dataset of IMF country reports and demonstrates how it can be a useful foundation for further research into the role of international financial institutions.

Keywords: *economic policy, IMF, text analysis, original dataset*
JEL classification: E60, F53

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1 Introduction

In this paper we are presenting an original panel dataset which contains the corpus of the country reports published by the International Monetary Fund (IMF) between 2004 and 2018 for 201 countries.[1]

The IMF country reports are one of the main go-to sources for economists and social scientists to gain insight on the latest economic developments and discussions of policy reforms under way. These reports prepared by IMF staff roughly once year provide a unique insight on their 189 member states. In the past, many cross-country studies have built on the content of these country reports, analyzing the policy advice they provide (Broome, 2015; Gallagher and Tian, 2017; Ortiz et al., 2015; Rodrik, 2006; Roy and Almeida Ramos, 2012), the conditionalities linked to the loans (Kentikelenis et al., 2016), (Mussa and Savastano, 1999) and the critical assumptions underpinning the analysis (Blanchard and Leigh, 2013). Research by Shin and Glennerster (2003) found that countries face lower borrowing costs when they opt to make the content of their IMF reports public. In addition to the economics literature, the IMF country reports are also being used in the political science and international relations fields as well. Lombardi and Woods (2008) looks at the various outputs of the IMF's (including country reports) through an IR theory lens and examines whether they promote learning and socialization. Using data from IMF's Monitoring of Fund Arrangements database (Dreher et al., 2015) analyzes the connection between IMF conditionalities and a country's political importance. This non-exhaustive list of research demonstrates that IMF reports serve as an important data source. With regards to their research method, the works cited above rely, at least partially, on the qualitative review of country reports. For example, (Broome, 2015) reviews all country reports for four countries over multiple decades, (Gallagher and Tian, 2017) reviews 528 reports for 33 countries in 16 years and (Ortiz et al., 2015) reviews 616 reports globally published in a 5 year window.

With the advances in computer assisted text analysis it became possible to quantitatively assess large bodies of text, which previously would have required vast amount of hand-coding. It was shown that quantitative content analysis is a viable (and often better) technique when compared to qualitative coding by experts (Laver and Garry, 2000; Laver et al., 2003). Political science research has been experimenting with quantitative content analysis for some years now and developing novel methods to exploit the huge amount of text data available (Lowe, 2008; Grimmer and Stewart, 2013). The economics literature similarly started to make use of texts as data, which is surveyed in a recent paper, where Gentzkow et al. (2017) reviews the possible techniques and use cases for economic analysis.

Applications include using central bank communications to predict changes in policy rates (Apel and Grimaldi, 2012), fluctuations in Treasury securities (Lucca and Trebbi, 2009) and identifying home bias by analyzing the tone of the speeches of the members of the Governing Council of the Eurozone (Bennani and Neuenkirch, 2017). Similar approaches were used to forecast trends in unemployment by examining Google search queries (Choi and Varian, 2009). Other approaches used newspaper articles to measure policy uncertainty in the US (Baker et al., 2016) and forecast stock prices using the sentiment of newspaper articles relating to particular companies (Tetlock, 2007). Finally, Gehring and Lang (2018) used the tone of credit

[1] The dataset is currently available upon request. We plan to release the full dataset with accompanying codes and a codebook upon publication of this companion paper.

rating agency statements to evaluate the impact of IMF programs.

Three papers have deployed automated searches on IMF reports. (Sands et al., 2016) looks at mentions of pandemics before and after outbreaks, (Kenny and O'Donnell, Kenny and O'Donnell) looks at mentions of gender over time and (Beaudry and Willems, 2018) retrieves the names of mission chiefs and looks at their influence on IMF forecasts.

As this brief overview shows, the explosion of technical and methodological advances gave way to a wide range of research applications that provide important insights for social scientists. With our novel original dataset we aim to contribute to this growing body of research by providing a new and exciting way to look at the possible impact of the IMF's country reports. The paper is structured into four main sections. In the first section we briefly cover the context of the IMF's country reports and why they are important data for research. The second section introduces the dataset. It provides details on the methodology of the data acquisition and processing. We also cover the basic descriptive qualities of the panel there and some discussion on the limitations and missing data. The third section provides some cursory glance at possible use cases for the data, such as using a dictionary to look up word frequencies of keywords of interest and associations between such frequencies and policy actions. Finally, in the fourth section we conclude our paper and discuss further avenues for refining the dataset and using it for research.

As Gentzkow et al. (2017, 50) note in their review in the quantitative text analytics literature "virtually all of the methods applied to date, including those we would label as sophisticated or on the frontier, are based on fitting predictive models to simple counts of text features" . This is the method we follow in the illustrative examples we present in the validation section.

2 IMF country reports and their contents

The IMF is one of the most influential international financial institution. It engages in monitoring economic and financial policies, offers technical assistance on economic affairs, and provides loans to countries in need. The monitoring of country policies is carried out as part of the consultations based on the Article IV of its Articles of Agreement. In the case of countries receiving IMF financial assistance, additional monitoring takes place through regular program reviews.

IMF country reports are drafted by IMF teams. A small team of IMF economists visits the country in-person (the "IMF mission") to gather data, information and hold discussions with mainly government and central bank officials, but also sometimes private investors, labor representatives, members of parliament, and civil society organizations. Upon its return to headquarters, the staff prepares a report, which forms the basis for discussion by the Executive Board. The Board's views are subsequently summarized and transmitted to the country's authorities. The views expressed in these report are those of the IMF staff team. The views of the Executive Board are summarized in a Public Information Notice (PIN), more recently which is attached to the Article IV report. Comments by the authorities on the staff report are also attached, if any were submitted at the time of the Executive Board discussion. The policy for publication of Article IV staff

reports allows for the deletion of market sensitive information.

In principle, Article IV consultations with members takes place annually. The Fund may decide to place a member on an "extended consultation cycle" that is longer than 12 months but not longer than 24 months. This can be done only if the member does not meet any of the following criteria: the member is of systemic or regional importance; the member is perceived to be at macroeconomic risk; the member is facing pressing policy issues of broad interest to the Fund membership; the member has large outstanding credit to the Fund [2]. Countries under IMF program may also be placed on a 24-month consultation cycle, but will generally have more frequent (semi-annual or quarterly) program review reports, which combine a backward-looking assessment with a forward-looking perspective [3].

On April 5, 1999, the IMF Executive Board agreed to a pilot project for the voluntary release of Article IV staff reports. Since February 2004, reports are made public by default unless the country blocks publication. Currently, nine out of ten member countries agree to publication of a Press Release, which summarizes the staff's and the Board's views, and four out of five countries agree to publication of the staff report itself. The availability of country report is even higher for program reviews, 96 percent of them are made public. [4]

These country reports follow a similar structure. First, the PIN or Press Release, followed by the Staff Report, then Information Annexes, then additional analysis, then comments by the authorities (if any). The PIN is rather short (approx 3 pages) and summarizes the staff report and describes in brief the IMF Executive Board's views. The staff report follows the following structure: first it provides some country background, then describes recent policy developments, then outlook and risks, then key policy areas are discussed in-turn: fiscal policy, monetary policy, financial sector, structural and competitiveness policies. A staff appraisal summarizes findings and provides policy recommendations. Data tables conclude the staff report, which provide actual and forecast values of key economic indicators. Additional annexes describe further analysis prepared by the IMF staff, for example debt sustainability analysis or macro-prudential analysis. Finally, authorities may chose to provide comments on the IMF report, though in practice they more often don't. While the report's main purpose is to surface any risk to domestic and global stability, in practice these reports touch on a variety of policies deemed economically significant.

3 The IMF country reports dataset

3.1 Scraping, cleaning and constructing the database

We scraped 6347 PDF documents from from the IMF website which were tagged as country reports published between 1st January 2004 and 31st December 2018.[5] We then stored each document alongside the corresponding meta data displayed on the IMF website: the title of the document, its publication date, a

[2] Selected Decisions and Selected Documents of the IMF, Issue 39 - Article IV Consultation Cycles. As updated as of March 31, 2017

[3] Factsheet. As updated as of March 6, 2018

[4] Transparency at the IMF: http://www.imf.org/en/About/Factsheets/Sheets/2016/07/27/15/35/Transparency-at-the-IMF

[5] http://www.imf.org/en/publications/search?when=After&series=IMF+Staff+Country+Reports

series ID, the URL and the filename. This was done using Webscraper.io [6]. We then converted these PDF documents into plain text using the PDFtotext tool[7] and textract [8].

We first divided these documents into two groups based on their title: general and thematic country reports. We kept only the general staff reports: either those labelled Article IV Consultations, IMF program reviews or Post-Program Monitoring. This means that we dropped all thematic country reports, including "ROSC" reports on the compliance with various international standards and codes, Financial Sector Assessments, Poverty Reduction Strategy Papers, and Selected Issues Reports which as its name indicates will focus on only a handful of policy areas.

The reason we dropped these thematic reports is because unlike country reports, they don't conform to similar structure and depth of analysis. The content of a single such thematic report (e.g. 50 pages on Value Added Taxes) may skew the overall body of text for very strongly in one direction. It is also difficult to reconcile how the topics of these reports are selected and their scope defined. While encouraged, publication of thematic reports is voluntary, and there is more variance on whether and when (often years later) they are published. Therefore, unlike general staff reports, the body of text from thematic reports is unlikely to be balanced across major topics of relevance from the perspective of macroeconomic risks. We dropped such thematic reports and were left with 5561 general reports .

We also note that there are 160 reports that relate not to a single country rather to a country group, such as a currency or trade union.[9] The IMF also writes regular country reports on the individual member states within these groups, and we expect those provide more directly relevant information on the country in question. Therefore we do not use the country group reports in country level analysis, but do include them in the dataset.

The final dataset includes 5561 reports, from 2004 to 2018. We chose 2004 as our starting year, because this is the year when reports became published by default. There are much fewer country reports from earlier periods, and even among these the majority are scanned PDF which make text recognition difficult and imprecise. The make-up of the reports is the following: 160 Country group reports and 5401 individual country reports. We classified the individual country reports into four categories based on their content: (i) Article IV reports, (ii) IMF program documents[10], and (iii) other staff reports. Table 1 shows the distribution of documents.

As the IMF does not provide a consistent categorization for all documents uploaded to their website (the tags available on the website are less reliable especially for older documents) we created our own categorization using the title of the reports. Similarly, the subject year for the Article IV reports were taken from the document title, as sometimes the subject year and publication year can differ, depending when the document

[6] http://webscraper.io/

[7] https://github.com/jalan/PDFtotext

[8] https://textract.readthedocs.io/

[9] Such country groups are the Baltic cluster, Central African Economic and Monetary Community, Central and Eastern Europe, Eastern Caribbean Currency Union, Euro Area, West African Economic and Monetary Union, and Multi-Country Reports.

[10] These include ongoing program evaluation reports, request for certain IMF programs from countries, and various IMF assistance program reports for emergency lending, stand-by agreement, flexible credit programs, debt relief programs and ex-post program evaluation documents.

Table 1: Distributions of documents in the dataset

Type of document	Count	mean word count	Std.dev of word count	min	max
Article IV	1639	33.40	10.30	13.10	87.90
Country group report	160	32.00	24.20	2.90	194.00
IMF program document	1138	34.30	14.30	3.10	150.70
Other staff report	2624	31.20	32.30	2.30	426.90

got uploaded to the IMF's website.

The variables included in the dataset are the following:

Table 2: Variables in the dataset

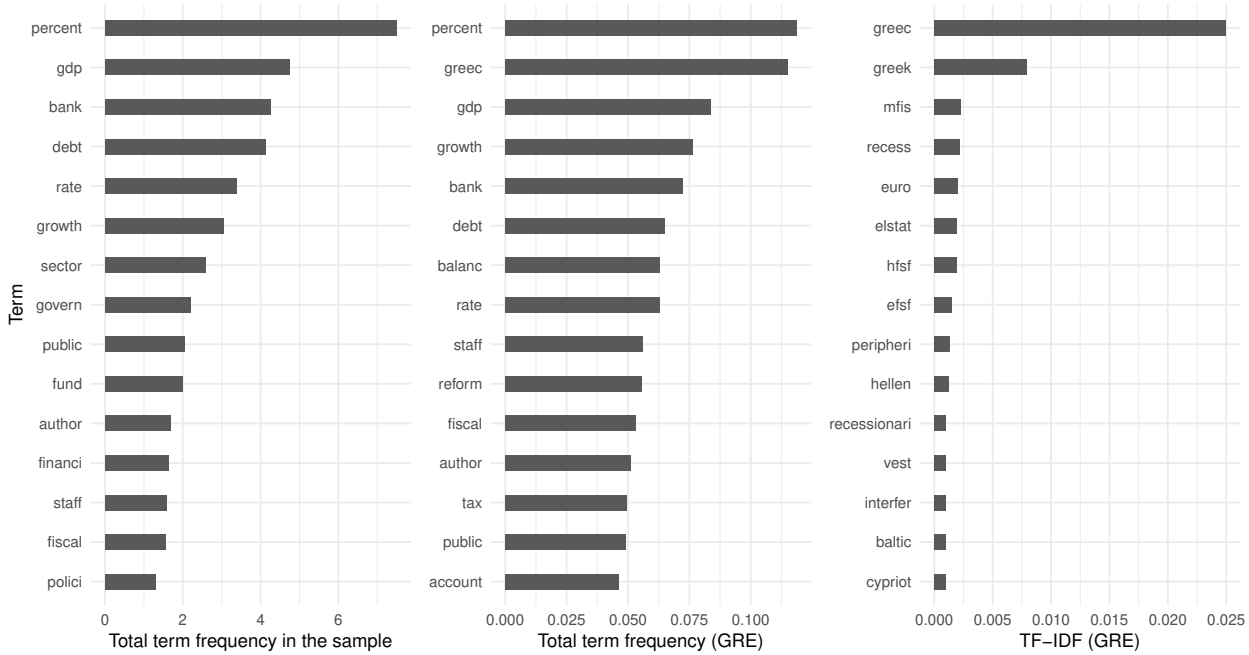
Variable	Description
ccode	ISO 3166-1 alpha-3 country code (Country groups are coded "CG")
country	Name of the country being reported (country group reports are coded as "Country group")
year_p	Year of the report being published online (present for all documents)
year_s	Subject year for Article IV reports (missing for the other type of documents)
doc_name	The internal document name of the report (serves as unique ID for the reports)
title	Full title of the country report
text	The raw plain text content of the report, without any pre-processing or formatting.
type	the type of the document. See Table 1

3.2 Using the dataset

The dataset allows to search for any keyword across reports and retrieve a clean panel table which summarizes the frequency of mentions of the search term across country and years. The search term can be a single term , such as 'elections', 'protest' or 'default' (unigrams) or a combination of words such as 'raise taxes' or 'labor market reform' (n-grams). The output of the search can be summarized using the following metrics. First, the absolute number of search hits by country year provides a crude metric of relevance, but countries or years with longer or more frequent reports will be over-represented. Second, we can analyze the term frequency (tf), measured for example occurrence in every 1000 word of text. Third, and this is our preferred approach, we can analyze the term frequency-inverse document frequency (tf-idf), which provides a numerical statistic which reflects how important a keyword is within a single document in contrast to its frequency across all other documents. Figure 1 illustrates this point.

The bar chart on the left depicts the highest term frequency unigrams across a random sample of 500 reports and shows that 'GDP', 'percent' and 'bank' occupy the top spots. When looking a single report (the 2013 Article IV report on Greece), as per the bar chart in the middle, many of the top term-frequency unigrams are the same, though many terms specific to Greeece (including the country's name) also appear. The third bar graph shows the term frequency -inverse document frequency for the same Greek document. It shows that words specific to the Greek context of the time show on the top list, including mentions of the recession, words relating to financial sector stability ('MFIs', 'HSFS') and to the Eurozone ('Euro', 'EFSF').

Figure 1: Highest term frequency words in sample and in a single report



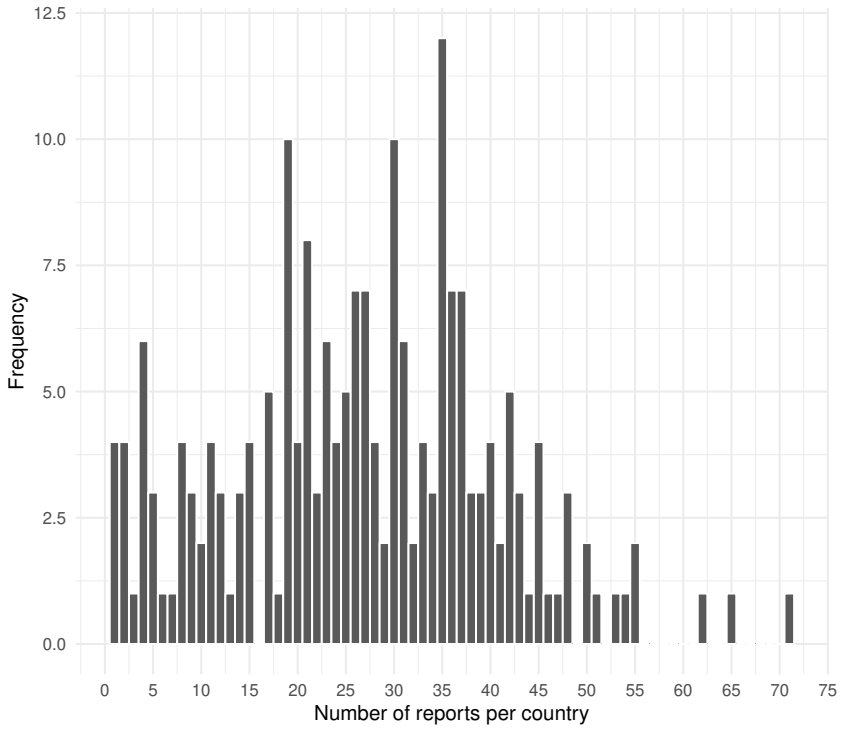
The dataset and accompanying code, which we plan to release publicly alongside documentation allows for

conducting such searches effectively as well as more advanced text analyses.

3.3 Main properties

The panel consists of 5561 observations for the years between 2004 and 2018. The detailed breakdown of country reports per year is presented in Table 3. The distribution of reports per countries is rather uneven (as shown by Figure 2) as a result of some countries receiving more IMF staff visits than others. There are some notable instances of denying access to IMF staff, such as Venezuela and Argentina. The median reports per country is 13, while the mean is 13.5. As for outliers in the report numbers, there are 15 countries that have 5 or less, and 8 countries with 25 or more reports.[11]

Figure 2: Distribution of country reports per country



In the Appendix, Table 6 gives a more detailed look at number of reports per countries in the panel, as well as the first and last year the country had an IMF report published and average report per year for the period the country participated in the reporting process.[12] However, our dataset covers most of the countries (with some notable exceptions, such as Venezuela). It is also visible that our panel contains more reports for the Central Eastern European, and certain African and Latin American countries.[13]

[11] Countries with 5 or less reports: Anguilla, Argentina, Bhutan, Brazil, Ecuador, Guyana, Macau SAR China, Montserrat, Nauru, Serbia and Montenegro, Somalia, South Sudan, Syria, Tuvalu, Uzbekistan. Countries with 25 or more reports: Armenia, Ireland, Jamaica, Mexico, Pakistan, Romania, Rwanda, Uganda

[12] This table includes all types of reports in the dataset.

[13] With high report count for Ireland and Greece as well, due to the global financial crisis.

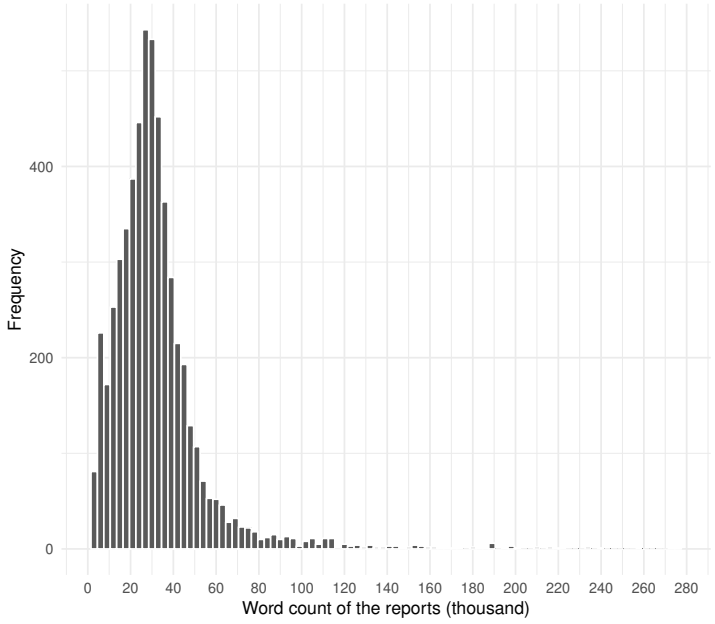
The descriptive statistics for the corpus in Table 3 shows that the mean word count and the standard deviation of the word counts are stable over the panel. However, the minimum and maximum word counts for some country reports display considerable fluctuations over the years.

Table 3: Descriptive statistics of the dataset, grouped by years

Year	Reports total	Article IV	IMF Program doc.	Mean word count	Std.dev word count	min	max
2004	114	68	46	34.50	11.70	10.50	78.10
2005	174	108	66	34.10	12.10	3.70	87.30
2006	191	113	78	32.70	11.50	3.10	64.80
2007	175	110	65	30.90	9.60	4.20	60.50
2008	181	106	75	32.30	15.20	5.30	150.70
2009	206	107	99	31.40	11.90	4.80	95.00
2010	226	122	104	32.40	11.10	4.30	70.70
2011	214	108	106	31.30	11.90	4.30	82.90
2012	184	103	81	33.90	12.30	12.70	111.80
2013	190	112	78	35.20	15.00	10.90	125.70
2014	195	114	81	33.70	12.20	13.60	122.80
2015	189	113	76	34.20	10.40	5.50	78.10
2016	179	118	61	37.50	10.70	17.10	75.20
2017	177	119	58	36.50	11.50	15.90	87.90
2018	182	118	64	37.50	10.90	6.60	72.90

The distribution of word counts is shown in Figure 3. Due to the verbosity induced by the global financial crisis, the distribution is somewhat skewed. The distribution and descriptive statistics for the sentence count in the corpus tracks the word counts.

Figure 3: Distribution of the word count in the corpus



3.4 Limitations of the dataset

One key issue that researchers should pay attention to is that the availability of country reports is not distributed uniformly in the data set. Not all countries get the same amount of surveillance, where some countries which might be deemed at lesser risk or of smaller global significance may be monitored in less detail given resource constraints of the Fund. On the other hand, countries with higher macroeconomic vulnerabilities or undergoing IMF program may get more in depth monitoring.

Another factor is that in some cases the country authorities may refuse to have the Article IV published. IMF publications on transparency reveal this happened in about 20 percent of cases in 2004-2005, when our dataset starts and gradually declined to 5 percent of cases in 2014-16 [14]. An earlier study by Edwards et al. (2011) finds that more democratic governments are more likely to release reports, as well as a strong variation in regional patterns (most notably less report in Latin America).

These matter for the research design. The likelihood of a key word appearing at all in reports will depend on the likelihood of the report being published and its depth. The frequency of certain themes may also affect whether the report gets approval from authorities to be published.

We build on Edwards et al. (2011) in the selection of explanatory variables and review how the following variables affect report availability and length of reports.

Table 4: Independent variables for the Heckman Two-Stage model

Variable	Description and source
Population	in log form from World Bank
GDP per capita	in log form from World Bank
Debt service	as percentage export earnings from World Bank
IMF program	in place for at least 5 months in the year (Dreher, 2006) updated
Polity IV score	on a -10 to 10 scale (polity2) from Quality of Government dataset.

We analyze the availability and length of reports using a two-step regression (or Heckman correction). First, we look at the likelihood of having a public report in a given year in a given country using probit regressions depending on whether the country is going through an IMF program and its polity IV score. We present marginal coefficient plots for polity score 4 and whether the country has an IMF program that year 5. In the second stage, conditional on having a report published, we look at how the population, income and debt variables affect the average length of reports (thousands of words) by country in using linear regressions. The results of the Heckman Two-Stage model is in Table 5

We find that there is a higher likelihood of having a report in instances where countries are undergoing IMF programs at the time of assessment. An IMF program increases likelihood of coverage in any given year by over 10 percentage point. We also have higher report coverage in country years with higher institutional

[14] Source: Key Trends in Implementation of the Fund's Transparency Policy, IMF

Table 5: Heckman two-stage model results

	Step 1:	*Step 2:*
	Report year	Word count (000)
Polity IV score	−0.0022	
	(0.0060)	
IMF program	−0.4416***	
	(0.1228)	
Constant	−0.0330	
	(0.0405)	
log(GDP per capita)		−3.8067***
		(0.3703)
log(Population)		0.7514***
		(0.2238)
Debt service		0.0110
		(0.0299)
Constant		25.3600***
		(9.1131)
Observations	1,355	
R^2	0.2049	
Adjusted R^2	0.1999	
ρ	1.1725	
Inverse Mills Ratio	32.7064*** (9.3387)	

Note: *p<0.1; **p<0.05; ***p<0.01

Figure 4: Likelihood of report availability depending on Polity IV score

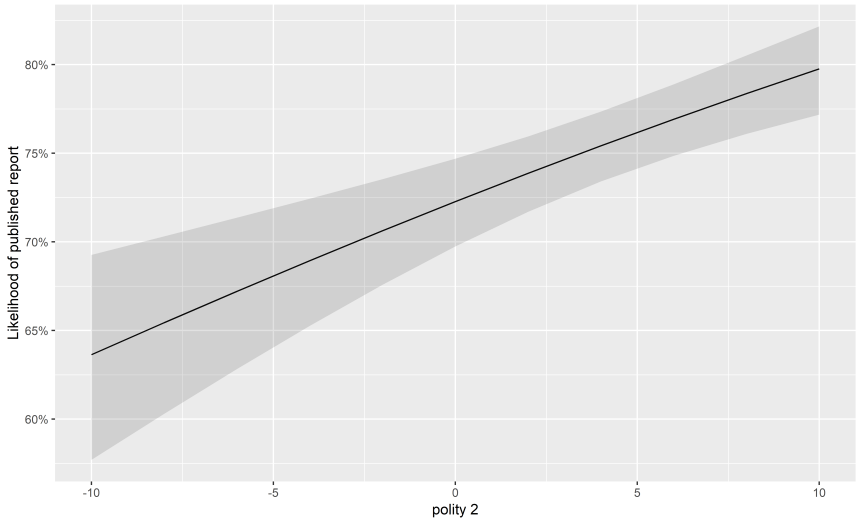
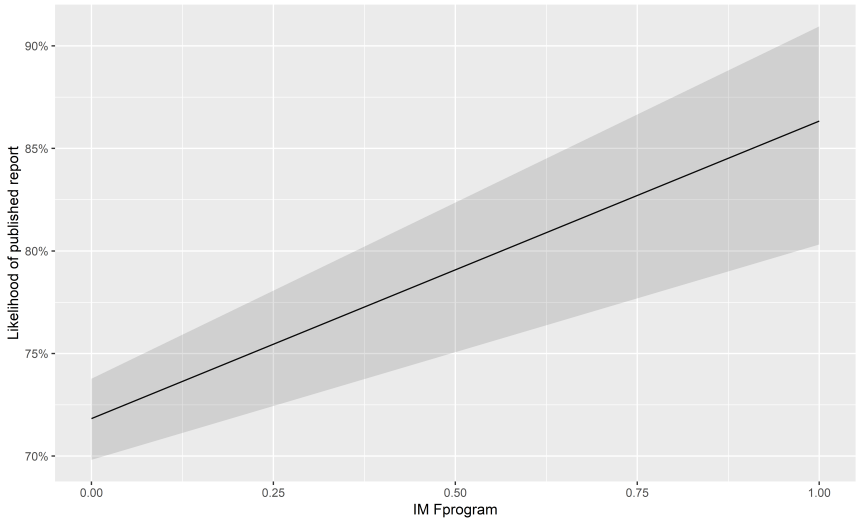


Figure 5: Likelihood of report availability depending on IMF program taking place



scores as measured by polity. Countries with lowest score are 15 percentage point less likely to report than those at high scores.

Conditional on having a report, we find that they are shorter for richer countries. Population and the relative size debt of debt service (a proxy for economic vulnerability) does not seem to make a difference.

Because rare keywords are more likely to appear in countries with more reports and longer text, measures of keyword appearance may be somewhat biased towards larger, less wealthy and more democratic countries and years of financial difficulty. These factors need to be taken into account when designing research using

the dataset. One avenue to address the bias is to measure the relative frequency of appearance of chosen keywords.

4 Demonstration and validation

The below section presents demonstrations at how the dataset may be used for applied in research. These short illustrations are not intended at providing substantive new empirical contributions. Rather they are meant to showcase and validate that text analytic metrics capture meaningful and important characteristics of IMF country diagnosis and advice.

For the analysis we used the R package "quanteda" (Benoit, 2018) to create a document-feature matrix from our corpus, which allows for extracting various word frequency measures.[15] We created a document-feature matrix with single words as tokens and with bi-grams (two word combinations) as tokens.

Our first illustrative case look at the distribution of a keyword (oil) across countries, the second one looks at discussion of reforms vs actual reform events (fiscal rules), and the third illustrates changes in IMF policy priorities over time (consolidation vs stimulus).

We review whether the countries which are considered resource dependent based on conventional economic metrics are the ones where oil is most frequently discussed in country reports. We calculated the frequency of appearance of the word oil across reports, using term frequency with inverse document frequency weighting. We contrast that with fuel exports as percentage of all merchandise export (from World Bank). We chose the fuel exports measure because it is the most widely used measure of oil dependence and has high cross-country coverage. We plotted the results on figure 5.

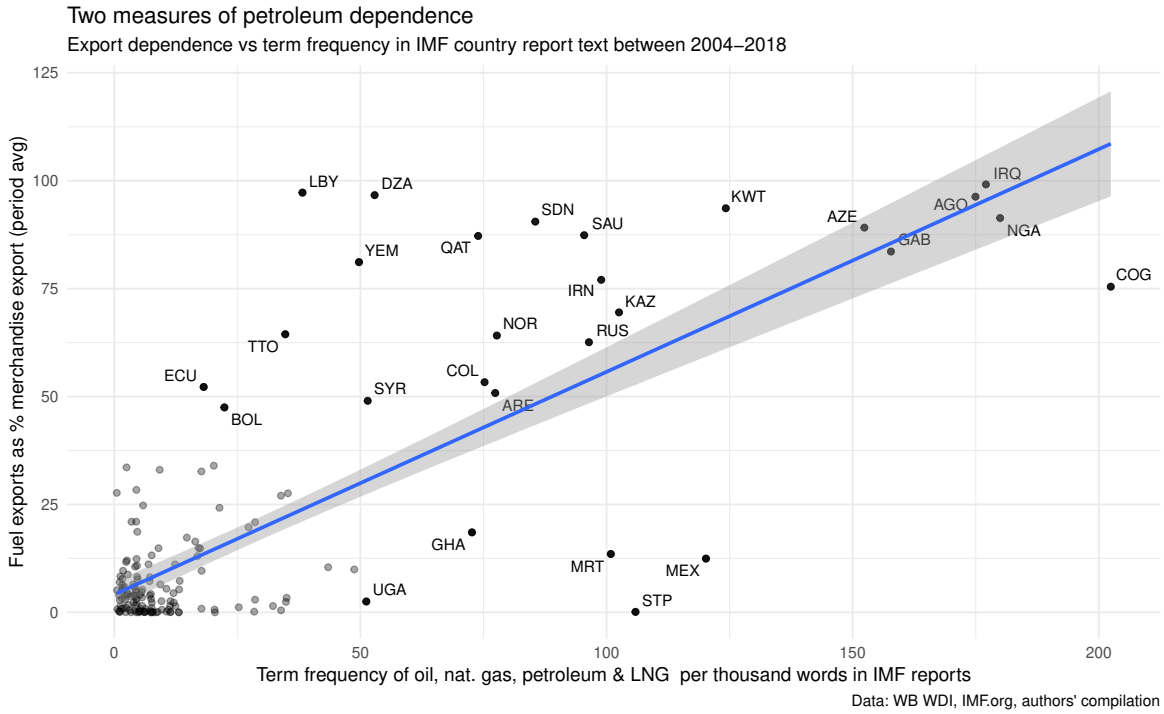
We find a strong positive correlation, with an R-squared of nearly 50 percent. Most countries export no oil, or oil export are tiny in fraction to other goods, and in their reports oil is infrequently mentioned. The 5 countries where oil is most frequently mentioned are in order: Chad, Nigeria, Republic of Congo, Iraq, Gabon, all extremely oil dependent countries (note that no export data for Chad, hence not displayed on plot). This reaffirms, that IMF reports focus heavily on the key sector in these countries.

Another interesting insight comes from the countries below the trend line, where oil is mentioned more than the level of resource dependence would directly imply. Among these are 4 new or prospective oil exporters Uganda, Ghana, Sao Tome, Mauritania, where oil export is low, but IMF reports discuss the expected rapid ramping up of oil production and exports in the future.

This example validates and demonstrates that text search can be used to capture the perceived salience of various macroeconomic risk factors across reports.

[15] In some cases in the literature document-term matrix is also used and refers to the same concept.

Figure 6: Two measures of oil dependence



4.1 Comparing actual reform and reform intent

We have conducted bigram search on the term 'fiscal rule' and related terms ('expenditure rule', 'debt rule', 'balance rule', 'deficit rule', 'revenue rule'). This allows to analyze whether fiscal rules are being more frequently discussed in IMF country reports prior to adoption or major changes to existing fiscal rules. The data on the fiscal rules is based on the IMF FAD Fiscal Rule dataset (**?**).

Fiscal rules are mentioned in 25 percent of all reports. Figure 6 shows that there has been a gradual increase in the number of fiscal rules across countries, and they are also being mentioned in increasing frequency across reports especially since 2008.

Figure 7 shows the frequency of search term appearance depending on whether the country has a fiscal rule, has no fiscal rule, and when the fiscal rule is being implemented or being reformed. Fiscal rules are mentioned at all about twice as frequently in countries which currently have fiscal rules (35 percent of reports), than in countries without fiscal rules (18 percent of reports). They are also being discusses with increasing frequency over time across all groups. But the graph also shows a sharp increase in mentions (and especially term frequency, which takes into account how much it is mentioned in a single report) before first implementation of a fiscal rule and major reform of the fiscal rule (as per IMF FAD dataset). This suggests that IMF is closely monitoring reforms to fiscal rules and probably in many cases providing its own advice.

This example highlights how text search can be used to capture the sequencing of IMF advice and reform

Figure 7: Percentage of countries with fiscal rules and reports with fiscal rule mentions by year

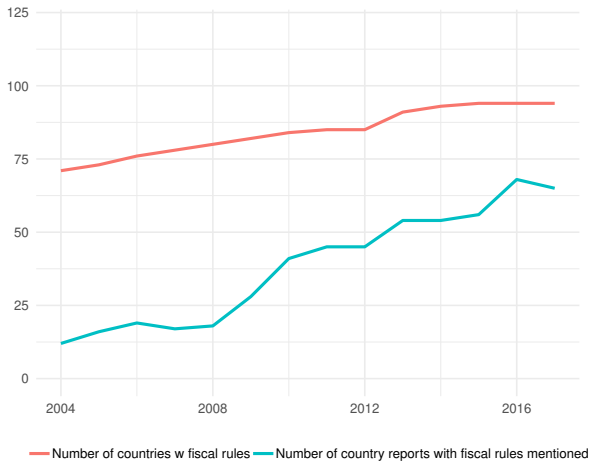
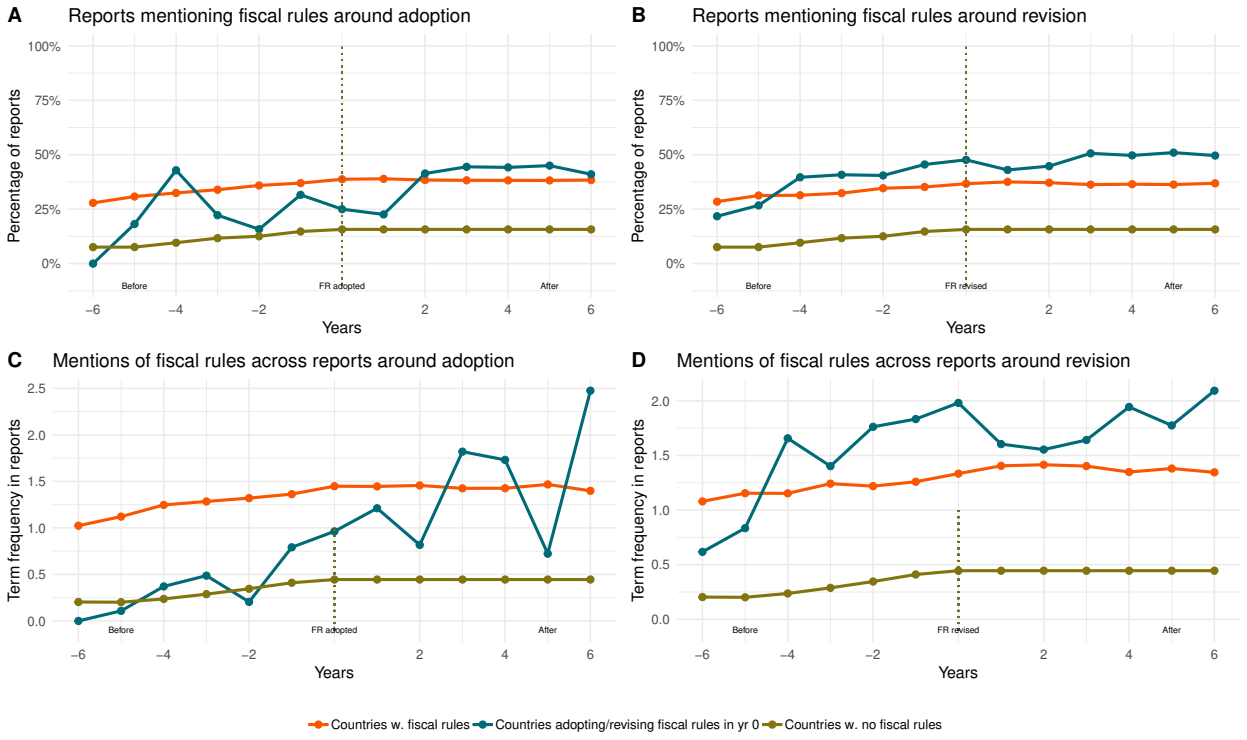


Figure 8: Mentions of fiscal rules vs actual fiscal rules



events. It also validates that such fiscal policy reforms are indeed reflected in our dataset.

4.2 Changes in perceived policy priorities

The dataset also enables to monitor changes to perceived policy priorities. We have constructed dictionaries that describe opposite fiscal policy directions.[16]

Table 6: Dictionaries used

Dictionary	Items
Fiscal consolidation	fiscal consolid*, fiscal discipl*, restor* fiscal, fiscal slip*, fiscal solv*, fiscal adjust
Fiscal stimulus	fiscal stimul*, stimul* package, fiscal expan*

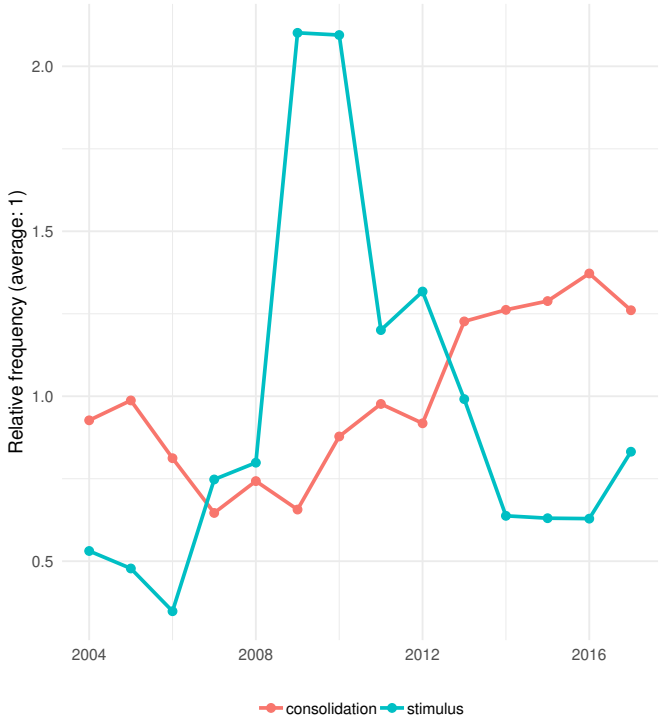
The longer list of key words associated with consolidation appears much more frequently than the words associated with stimulus. But when evaluating relative frequency of their appearance, we can discern trends over time. We find a sharp increase in mentions of stimulus in 2009 and 2010, then followed by a rapid decline. In the meantime fiscal consolidation mentions have increased starting in 2010.

This mirrors the patterns described in (IMF, 2014) and (Dhar, 2014) which discusses IMF policy advice in response to the financial crisis. In fact, the so-called Triennial Surveillance Review, manually reviewed their country reports to map the policy advice it had provided on a sub-sample of 24 countries. They found that across these 24 countries short-term stimulus was recommended in 3/4 of IMF article IVs in 2009 (IMF, 2014).

This illustration provides an example on how text search can be used to map whether changes in global policy pronouncements are being reflected in country reports. The fact that our dataset mirrors the analysis carried out using manual review of the text also validates our approach.

[16]The * denotes a wildcard, e.g.: restor* will find restor*ing* as well as restor*ation*

Figure 9: Relative frequency of mentions of keywords associated with consolidation and stimulus by year



5 Conclusion

IMF country reports are a treasure trove of information on the economic and policy developments of countries across the world. They also provide a window into the policy priorities and advice that the IMF provides. We presented a new dataset which builds on the content of these country reports and show how simple text analytic techniques can be used to gain new insight on this important international organization. This includes studying the length of document and the frequency of mentions of specific keywords over time, across countries and in the years surrounding policy change or economic shocks.

Subsequent refinement of the dataset may decompose reports into its chapters, enrich the meta data with authors and exact dates of drafting. In future work, this dataset can be used to study the factors which may influence the priorities and the overall tone of IMF surveillance across countries and over time. It can be used to examine financial market response to country report findings. It also enables to study if and when IMF policy recommendations are being followed through. Taken altogether, subsequent work using the dataset can help disentangle the determinants and impacts of the IMF's surveillance work.

6 Appendix

Table 7: Number of reports per country in the panel

Country	ccode	First report	Last report	No. of reports	Mean
Aruba	ABW	2005	2018	8	0.6
Afghanistan	AFG	2004	2018	44	3.1
Angola	AGO	2005	2018	21	1.6
Albania	ALB	2004	2018	39	2.8
Andorra	AND	2007	2007	1	
United Arab Emirates	ARE	2004	2017	28	2.2
Argentina	ARG	2004	2018	19	1.4
Armenia	ARM	2004	2018	45	3.2
Antigua & Barbuda	ATG	2004	2015	14	1.3
Australia	AUS	2004	2018	36	2.6
Austria	AUT	2004	2018	36	2.6
Azerbaijan	AZE	2004	2016	19	1.6
Burundi	BDI	2004	2015	36	3.3
Belgium	BEL	2005	2018	35	2.7
Benin	BEN	2004	2018	38	2.7
Burkina Faso	BFA	2004	2018	42	3.0
Bangladesh	BGD	2004	2018	36	2.6
Bulgaria	BGR	2004	2018	30	2.1
Bahrain	BHR	2006	2016	3	0.3
Bahamas	BHS	2004	2018	17	1.2
Bosnia & Herzegovina	BIH	2004	2018	45	3.2
Belarus	BLR	2004	2018	41	2.9

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Country	ccode	First report	Last report	No. of reports	Mean
Belize	BLZ	2004	2018	25	1.8
Bermuda	BMU	2005	2008	4	1.3
Bolivia	BOL	2004	2017	20	1.5
Brazil	BRA	2012	2018	27	4.5
Barbados	BRB	2004	2018	20	1.4
Brunei	BRN	2005	2016	11	1.0
Bhutan	BTN	2004	2018	15	1.1
Botswana	BWA	2004	2018	26	1.9
Central African Republic	CAF	2004	2018	27	1.9
Canada	CAN	2004	2018	41	2.9
Switzerland	CHE	2005	2018	38	2.9
Chile	CHL	2004	2018	31	2.2
China	CHN	2004	2018	33	2.4
Cote d'Ivoire	CIV	2007	2018	35	3.2
Cameroon	CMR	2004	2018	35	2.5
Congo - Kinshasa	COD	2004	2015	26	2.4
Congo - Brazzaville	COG	2004	2015	33	3.0
Cook Islands	COK	2004	2004	2	
Colombia	COL	2004	2018	43	3.1
Comoros	COM	2004	2018	33	2.4
Cape Verde	CPV	2004	2018	31	2.2
Costa Rica	CRI	2004	2018	24	1.7
Cayman Islands	CYM	2005	2009	4	1.0
Cyprus	CYP	2005	2018	35	2.7
Czechia	CZE	2004	2018	30	2.1
Germany	DEU	2004	2018	45	3.2

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Country	ccode	First report	Last report	No. of reports	Mean
Djibouti	DJI	2004	2017	17	1.3
Dominica	DMA	2004	2018	23	1.6
Denmark	DNK	2004	2018	37	2.6
Dominican Republic	DOM	2006	2018	10	0.8
Algeria	DZA	2004	2018	37	2.6
Ecuador	ECU	2006	2016	5	0.5
Egypt	EGY	2005	2018	14	1.1
Spain	ESP	2005	2018	62	4.8
Estonia	EST	2004	2018	24	1.7
Ethiopia	ETH	2004	2018	30	2.1
Finland	FIN	2005	2017	27	2.2
Fiji	FJI	2004	2018	8	0.6
France	FRA	2004	2018	38	2.7
Micronesia (Federated States of)	FSM	2005	2017	12	1.0
Gabon	GAB	2004	2018	19	1.4
United Kingdom	GBR	2004	2018	55	3.9
Georgia	GEO	2004	2018	48	3.4
Guernsey	GGY	2011	2011	6	
Ghana	GHA	2004	2018	35	2.5
Gibraltar	GIB	2007	2007	4	
Guinea	GIN	2004	2018	36	2.6
Gambia	GMB	2004	2018	40	2.9
Guinea-Bissau	GNB	2005	2018	30	2.3
Equatorial Guinea	GNQ	2005	2018	19	1.5
Greece	GRC	2005	2018	37	2.8
Grenada	GRD	2004	2017	19	1.5

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Country	ccode	First report	Last report	No. of reports	Mean
Guatemala	GTM	2005	2018	21	1.6
Guyana	GUY	2004	2018	10	0.7
Honduras	HND	2004	2018	21	1.5
Croatia	HRV	2004	2018	26	1.9
Haiti	HTI	2004	2017	35	2.7
Hungary	HUN	2004	2018	37	2.6
Indonesia	IDN	2004	2018	42	3.0
Isle of Man	IMN	2009	2009	5	
India	IND	2004	2018	31	2.2
Ireland	IRL	2004	2018	55	3.9
Iran	IRN	2004	2018	21	1.5
Iraq	IRQ	2004	2017	23	1.8
Iceland	ISL	2005	2018	42	3.2
Israel	ISR	2004	2018	35	2.5
Italy	ITA	2004	2017	48	3.7
Jamaica	JAM	2004	2018	33	2.4
Jersey	JEY	2009	2009	4	
Jordan	JOR	2004	2017	26	2.0
Japan	JPN	2004	2018	45	3.2
Kazakhstan	KAZ	2004	2018	30	2.1
Kenya	KEN	2004	2018	34	2.4
Kyrgyzstan	KGZ	2004	2017	37	2.8
Cambodia	KHM	2004	2018	23	1.6
Kiribati	KIR	2009	2017	9	1.1
St. Kitts & Nevis	KNA	2007	2017	17	1.7
South Korea	KOR	2005	2018	26	2.0

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Country	ccode	First report	Last report	No. of reports	Mean
Kuwait	KWT	2004	2018	30	2.1
Laos	LAO	2004	2018	24	1.7
Lebanon	LBN	2004	2017	23	1.8
Liberia	LBR	2004	2018	40	2.9
Libya	LBY	2005	2013	12	1.5
St. Lucia	LCA	2004	2018	14	1.0
Liechtenstein	LIE	2008	2018	4	0.4
Sri Lanka	LKA	2004	2018	30	2.1
Lesotho	LSO	2004	2018	25	1.8
Lithuania	LTU	2005	2018	30	2.3
Luxembourg	LUX	2004	2018	28	2.0
Latvia	LVA	2004	2018	29	2.1
Morocco	MAR	2004	2018	43	3.1
Monaco	MCO	2008	2008	1	
Moldova	MDA	2004	2018	47	3.4
Madagascar	MDG	2004	2018	32	2.3
Maldives	MDV	2005	2017	12	1.0
Mexico	MEX	2004	2018	71	5.1
Marshall Islands	MHL	2006	2018	11	0.9
Macedonia	MKD	2004	2018	30	2.1
Mali	MLI	2004	2018	53	3.8
Malta	MLT	2005	2018	15	1.2
Myanmar (Burma)	MMR	2012	2018	11	1.8
Montenegro	MNE	2008	2018	22	2.2
Mongolia	MNG	2005	2018	34	2.6
Mozambique	MOZ	2004	2018	42	3.0

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Country	ccode	First report	Last report	No. of reports	Mean
Mauritania	MRT	2006	2018	31	2.6
Mauritius	MUS	2005	2018	22	1.7
Malawi	MWI	2004	2018	35	2.5
Malaysia	MYS	2004	2018	24	1.7
Namibia	NAM	2005	2018	25	1.9
Niger	NER	2004	2018	37	2.6
Nigeria	NGA	2004	2018	36	2.6
Nicaragua	NIC	2004	2017	19	1.5
Netherlands	NLD	2004	2018	51	3.6
Norway	NOR	2005	2018	27	2.1
Nepal	NPL	2004	2017	19	1.5
Nauru	NRU	2017	2017	1	
New Zealand	NZL	2004	2018	35	2.5
Oman	OMN	2005	2015	2	0.2
Pakistan	PAK	2004	2018	35	2.5
Panama	PAN	2006	2017	21	1.9
Peru	PER	2004	2018	31	2.2
Philippines	PHL	2004	2018	35	2.5
Palau	PLW	2004	2016	13	1.1
Papua New Guinea	PNG	2004	2018	23	1.6
Poland	POL	2004	2018	46	3.3
Portugal	PRT	2005	2018	43	3.3
Paraguay	PRY	2004	2017	35	2.7
Palestinian Territories	PSE	2018	2018	1	
Qatar	QAT	2008	2018	20	2.0
Romania	ROU	2004	2018	50	3.6

Continued on next page

Country	ccode	First report	Last report	No. of reports	Mean
Russia	RUS	2004	2018	50	3.6
Rwanda	RWA	2004	2018	48	3.4
Saudi Arabia	SAU	2006	2018	21	1.8
Serbia and Montenegro	SCG	2004	2006	11	5.5
Sudan	SDN	2005	2017	21	1.8
Senegal	SEN	2005	2018	40	3.1
Singapore	SGP	2004	2018	31	2.2
Solomon Islands	SLB	2004	2018	27	1.9
Sierra Leone	SLE	2004	2018	36	2.6
El Salvador	SLV	2004	2018	26	1.9
San Marino	SMR	2004	2018	19	1.4
Somalia	SOM	2015	2018	7	2.3
Serbia	SRB	2006	2018	32	2.7
South Sudan	SSD	2014	2017	2	0.7
S o Tom & Pr ncipe	STP	2005	2018	29	2.2
Suriname	SUR	2005	2018	20	1.5
Slovakia	SVK	2005	2018	19	1.5
Slovenia	SVN	2004	2017	26	2.0
Sweden	SWE	2004	2017	39	3.0
Swaziland	SWZ	2006	2017	15	1.4
Seychelles	SYC	2004	2018	25	1.8
Syria	SYR	2005	2010	8	1.6
Turks & Caicos Islands	TCA	2005	2015	2	0.2
Chad	TCD	2005	2018	27	2.1
Togo	TGO	2007	2018	30	2.7
Thailand	THA	2006	2018	23	1.9

Continued on next page

Country	ccode	First report	Last report	No. of reports	Mean
Tajikistan	TJK	2004	2016	27	2.2
Timor-Leste	TLS	2004	2016	18	1.5
Tonga	TON	2006	2018	15	1.2
Trinidad & Tobago	TTO	2005	2018	22	1.7
Tunisia	TUN	2004	2018	28	2.0
Turkey	TUR	2004	2018	28	2.0
Tuvalu	TUV	2011	2018	5	0.7
Tanzania	TZA	2004	2018	42	3.0
Uganda	UGA	2004	2018	65	4.6
Ukraine	UKR	2004	2017	37	2.8
Uruguay	URY	2004	2018	39	2.8
United States	USA	2004	2018	54	3.9
Uzbekistan	UZB	2005	2018	9	0.7
St. Vincent & Grenadines	VCT	2004	2017	17	1.3
British Virgin Islands	VGB	2010	2010	4	
Vietnam	VNM	2004	2018	25	1.8
Vanuatu	VUT	2005	2018	9	0.7
Samoa	WSM	2004	2018	19	1.4
Kosovo	XKC	2010	2018	21	2.6
Yemen	YEM	2005	2014	8	0.9
South Africa	ZAF	2004	2018	40	2.9
Zambia	ZMB	2004	2017	34	2.6
Zimbabwe	ZWE	2004	2017	17	1.3

References

Apel, M. and M. Grimaldi (2012). The information content of central bank minutes.

Baker, S. R., N. Bloom, and S. J. Davis (2016). Measuring economic policy uncertainty. *The Quarterly Journal of Economics 131*(4), 1593–1636.

Beaudry, P. and T. Willems (2018). On the macroeconomic consequences of over-optimism. Technical report, National Bureau of Economic Research.

Bennani, H. and M. Neuenkirch (2017). The (home) bias of European central bankers: New evidence based on speeches. *Applied Economics 49*(11), 1114–1131.

Benoit, K. (2018). *Quanteda: Quantitative Analysis of Textual Data*. R package version 1.3.4.

Blanchard, O. J. and D. Leigh (2013). Growth forecast errors and fiscal multipliers. *American Economic Review 103*(3), 117–20.

Broome, A. (2015). Back to basics: the great recession and the narrowing of IMF policy advice. *Governance 28*(2), 147–165.

Choi, H. and H. Varian (2009). Predicting initial claims for unemployment benefits. *Google Inc*, 1–5.

Dhar, S. (2014). IMF Macroeconomic Policy Advice in the Financial Crisis Aftermath. *IEO Background Paper No. BP/14/07 (Washington: International Monetary Fund)*.

Dreher, A. (2006). IMF and economic growth: The effects of programs, loans, and compliance with conditionality. *World Development 34*(5), 769–788.

Dreher, A., J.-E. Sturm, and J. R. Vreeland (2015). Politics and IMF conditionality. *Journal of Conflict Resolution 59*(1), 120–148.

Edwards, M. S., K. A. Coolidge, and D. A. Preston (2011). Who Reveals? Transparency and the IMF's Article IV Consultations.

Gallagher, K. P. and Y. Tian (2017). Regulating capital flows in emerging markets: the IMF and the global financial crisis. *Review of development finance 7*(2), 95–106.

Gehring, K. and V. Lang (2018). Stigma or Cushion? IMF Programs and Sovereign Creditworthiness.

Gentzkow, M., B. T. Kelly, and M. Taddy (2017). Text as data.

Grimmer, J. and B. M. Stewart (2013). Text as data: The promise and pitfalls of automatic content analysis methods for political texts. *Political analysis 21*(3), 267–297.

IMF (2014). 2014 Triennial Surveillance Review - Staff Background Studies. *International Monetary Fund Policy Papers*.

Kenny, C. and M. O'Donnell. Do the results match the rhetoric? an examination of world bank gender projects. *CGD Policy Paper 77*.

Kentikelenis, A. E., T. H. Stubbs, and L. P. King (2016). IMF conditionality and development policy space, 1985–2014. *Review of International Political Economy 23*(4), 543–582.

Laver, M., K. Benoit, and J. Garry (2003). Extracting policy positions from political texts using words as data. *American Political Science Review 97*(2), 311–331.

Laver, M. and J. Garry (2000). Estimating policy positions from political texts. *American Journal of Political Science*, 619–634.

Lombardi, D. and N. Woods (2008). The politics of influence: An analysis of IMF surveillance. *Review of International Political Economy 15*(5), 711–739.

Lowe, W. (2008). Understanding wordscores. *Political Analysis 16*(4), 356–371.

Lucca, D. O. and F. Trebbi (2009). Measuring central bank communication: An automated approach with application to FOMC statements. Technical report, National Bureau of Economic Research.

Mussa, M. and M. Savastano (1999). The IMF approach to economic stabilization. *NBER macroeconomics annual 14*, 79–122.

Ortiz, I., M. Cummins, J. Capaldo, and K. Karunanethy (2015). The decade of adjustment: A review of austerity trends 2010-2020 in 187 countries.

Rodrik, D. (2006). Goodbye Washington consensus, hello Washington confusion? A review of the World Bank's economic growth in the 1990s: Learning from a decade of reform. *Journal of Economic literature 44*(4), 973–987.

Roy, R. and R. Almeida Ramos (2012). IMF Article IV reports: An analysis of policy recommendations. Technical report, Working Paper, International Policy Centre for Inclusive Growth.

Sands, P., A. El Turabi, P. A. Saynisch, and V. J. Dzau (2016). Assessment of economic vulnerability to infectious disease crises. *The Lancet 388*(10058), 2443–2448.

Shin, Y. and M. R. Glennerster (2003). *Is Transparency Good for You, and Can the IMF Help?* Number 3-132. International Monetary Fund.

Tetlock, P. C. (2007). Giving content to investor sentiment: The role of media in the stock market. *The Journal of finance 62*(3), 1139–1168.